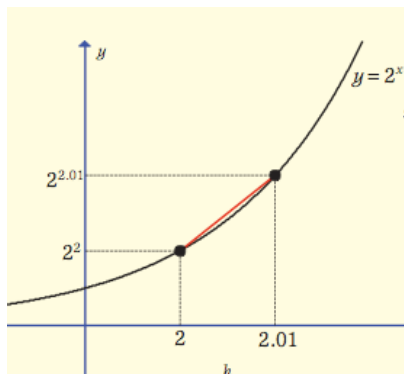




today's big goal You will learn one conception of Euler's number and understand some uses of natural log.

We're going to work with the slope function, finding the slope at any point on a function $f(x)$, defined as:



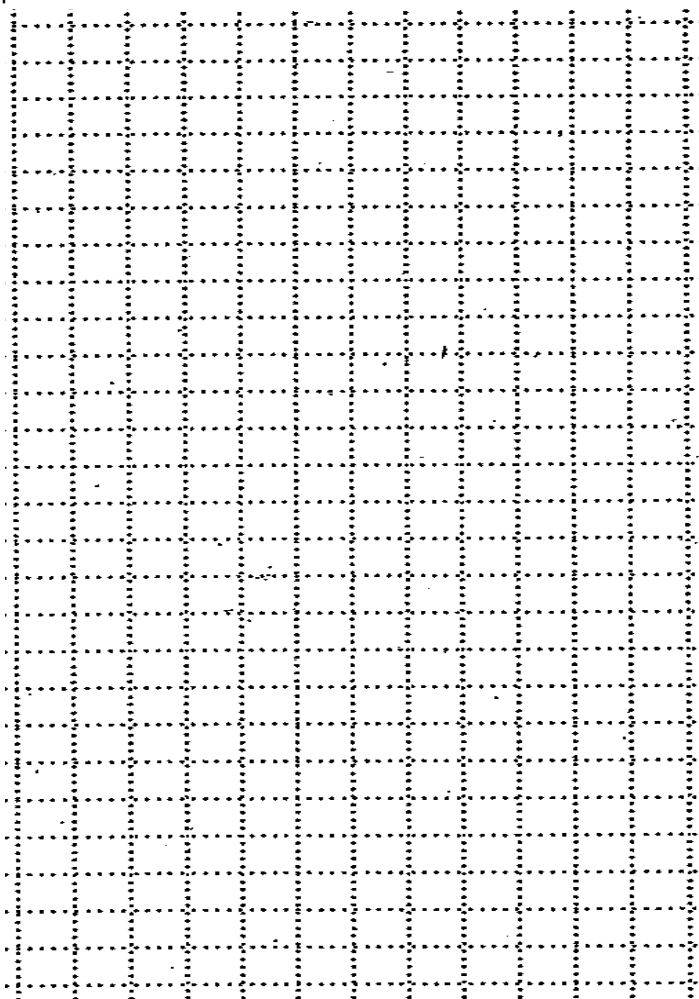
$$\text{slope}(x) = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

→ This essentially means the slope between two points that are really close to each other. **For today, we'll set $h=0.01$**

task 1

Make a table and graph for $y = 2^x$. Be sure to label each graph.

x	$y = 2^x$	Slope at x : $m = \frac{y_2 - y_1}{x_2 - x_1}$
0		
0.01		
1		
1.01		
2		
2.01		
3		
3.01		
4		
4.01		
5		
5.01		

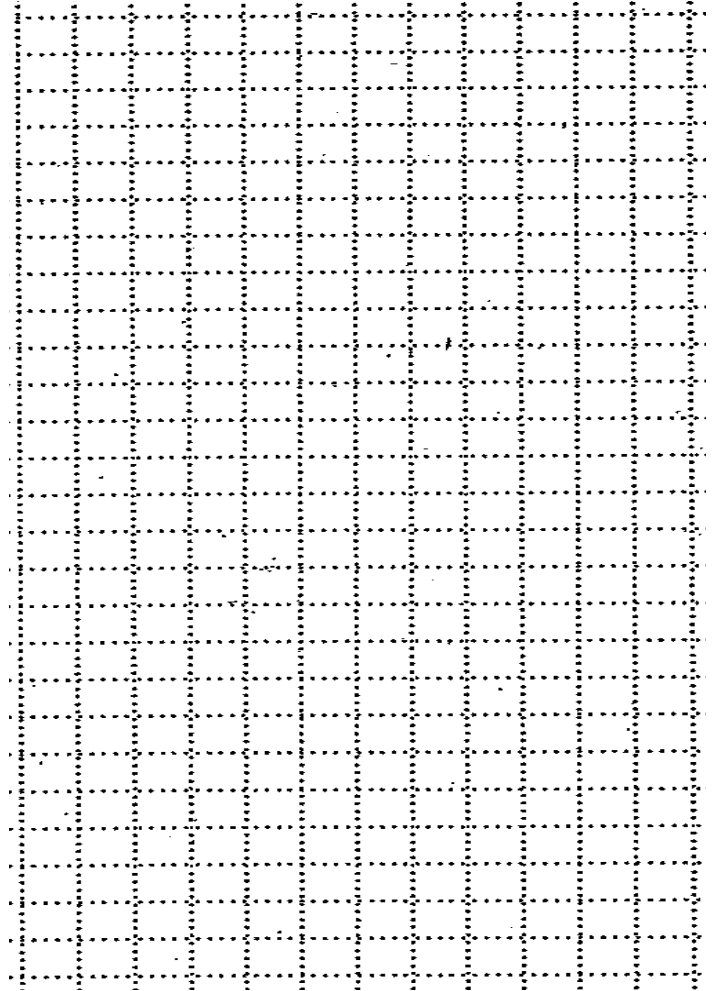


What do you notice about the slope function compared to the original function $y = 2^x$?

task 2

Make a table and graph for $y = 3^x$. Be sure to label each graph.

x	$y = 3^x$	Slope at x : $m = \frac{y_2 - y_1}{x_2 - x_1}$
0		
0.01		
1		
1.01		
2		
2.01		
3		
3.01		
4		
4.01		
5		
5.01		



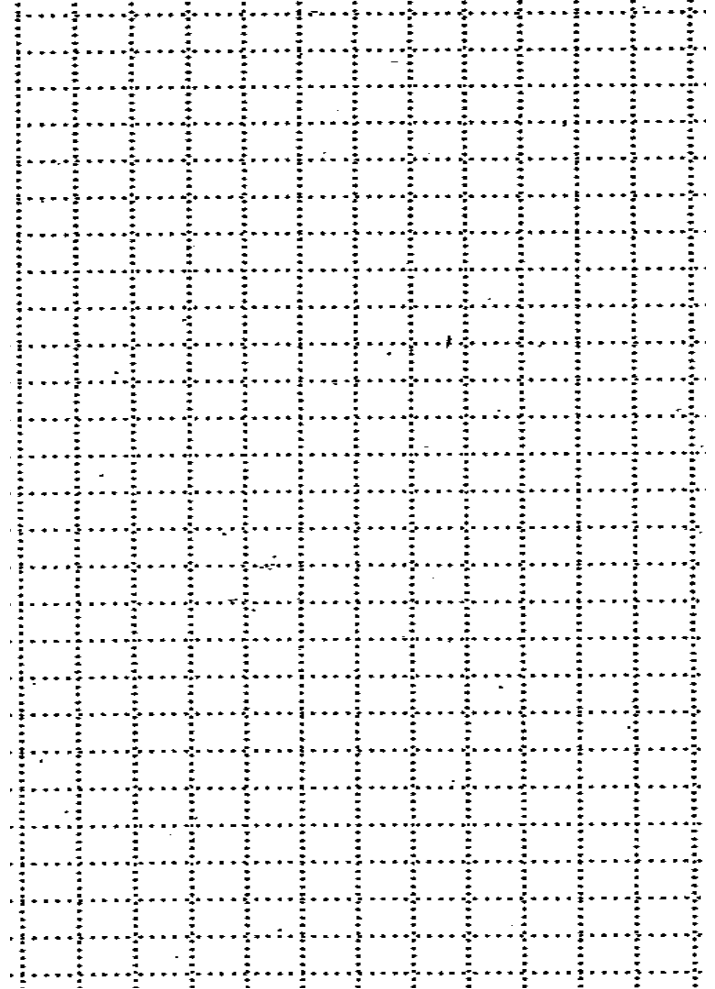
What do you notice about the slope function compared to the original function $y = 3^x$?

How does it compare with what happened in Task 1 with $y = 2^x$?

task 3

Have each group member pick a distinct value of b , then make a table and graph for $y = ______^x$

x	$y = ______^x$	Slope at x : $m = \frac{y_2 - y_1}{x_2 - x_1}$
0		
0.01		
1		
1.01		
2		
2.01		
3		
3.01		
4		
4.01		
5		
5.01		



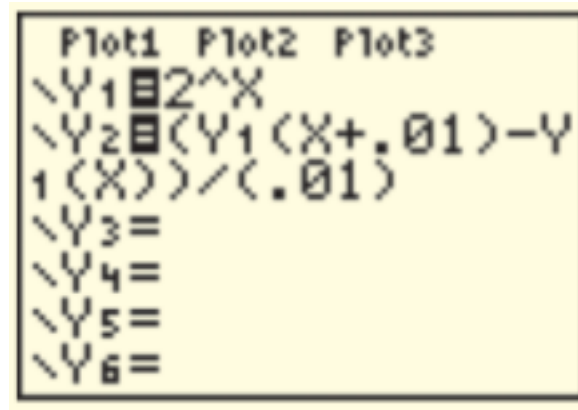
- Did the original function and slope function get closer together?
- Share your graph with your group. Are there other values of b that make the graphs even closer? What are they?

task 4 Finding that value exactly!

Slope can be defined in a different way:

$$\text{slope}(x) = \frac{y_2 - y_1}{x_2 - x_1} = \frac{f(x+h) - f(x)}{(x+h) - x} = \frac{f(x+h) - f(x)}{h}$$

Let's start by plotting both $y = 2^x$ and the slope function of $y = 2^x$ in the calculator. Here's how you can do it below:



Now examine the table.

	Original Fcn	Slope Fcn
X	Y1	Y2
-1	.5	.34778
0	1	.69556
1	2	1.3911
2	4	2.7822
3	8	5.5644
4	16	11.129
5	32	22.258

Are the values for the original function and the slope function close together?

Keep changing your original function (Y_1) to find the best possible value for b (where the original function & slope function are practically the same!). What is the best possible value for b ? _____

Euler's number (e)

$e \approx$

